## REMARKS

Applicants' would like to thank the Examiner for the careful consideration given to this case.

Claims 1-6 stand canceled, and claims 30-36 were canceled without prejudice by the Applicants to facilitate prosecution of the case. Applicants preserve the right to pursue claims 30-36 in one or more divisional Applications. Claims 7-29 and new claims 37-40 are pending in the case. No new matter has been added.

To clarify that the hollow conduits are bonded throughout the resin, Claim 7 now recites that the first and second end portions of the thermoplastic hollow conduits are **potted** in the first and second thermoplastic resins respectively as disclosed in Applicants' specification paragraph [0044]. Corrections were made for antecedent basis in claims 7, 9 and 10.

Claim 12 recites that the thermoplastic hollow conduits are perfluorinated co-extruded hollow tubes that are fused with the thermoplastic resin wherein the resin is a perfluorinated thermoplastic that is itself fused with the thermoplastic housing or the first and second sleeves that are a perfluorinated thermoplastic as disclosed for example in Applicants' specification, paragraph [0009]. Claim 15 recites that the thermoplastic materials of the exchange device are perfluorinated thermoplastics as disclosed for example in Applicants' specification, paragraph [0009].

Claim 16 further defines the structure of the co-extruded hollow conduits to be one or more co-extruded thermoplastic hollow conduits and the co-extruded thermoplastic hollow conduits have an inner thermoplastic layer fused to an outer thermoplastic layer. The outer thermoplastic layer of the co-extruded thermoplastic hollow conduits has a lower melting point temperature than the inner thermoplastic layer of said thermoplastic hollow conduits. Support

for this structure is provided in Applicants' specification paragraph [0041] last line pg. 23-first line pg. 24; paragraph [0044], last 6 lines; and paragraph [0057], pg. 37.

Claim 18 characterizes the exchange apparatus as one that maintains fluid integrity for 24 hours with hot oil fed into a shell side of the exchange apparatus at a flow rate of 6 liters per minute and no fluid flow on a tube side of the exchange apparatus, the hot oil is at a temperature of 140°C and pressure of 50 psig. This characterization of the exchange device is provided in Applicants' specification paragraphs [0011] and [00119].

Claim 20 recites that the thermoplastic hollow conduits have inner layer fused to an outer layer where the layers are perfluorinated thermoplastic materials (see Applicants' specification paragraph [0044], last 10 lines). The perfluorinated hollow conduits are fused to first or second perfluorinated thermoplastics resins and the housing or sleeves are perfluorinated thermoplastics as disclosed in Applicants' specification paragraph [0014] lines 4-8, paragraph [0041] pg. 23, and paragraph [0014], lines 4-9.

Claims 21, 25, and 29 includes corrections for antecedent basis.

Support for new claim 37 is taken from Applicants' specification paragraphs [0011], [00119], and Example 6. Support for new claim 38 can be found in Applicants' specification paragraphs [0032] and [0034]. Support for new claims 39 and 40 can be found in Applicants' specification paragraphs [0058] and [0063].

**Item 4.** Applicants respectfully traverse the Examiner's rejection of claims 7-14, 21-29, and 30-34 under 35 U.S.C. § 103(a) over Miyamoto (JP 05049875) in view of Eguchi (EP 0706818), and Applicants request reconsideration and withdrawal of this rejection. The

Examiner has asked the Applicants to show that claims 7-14, 21-29, and 30-34 are patentable over Miyamoto (JP 05049875) in view of Eguchi (EP 0706818).

Claims 30-34 were canceled by the Applicants.

Applicants have provided an English translation of Miyamoto (JP 05049875) in an Information Disclosure Statement made with the filing of this paper.

Applicants have clarified claim 7 to show that the thermoplastic resin at each end of the housing or in each sleeve is ***fused*** to the end portions of the hollow conduits ***and fused*** to one or more structures of the sleeve or housing surface interconnected by slots.

Miyamoto ***does not disclose hollow fibers that are fused*** to thermoplastic resin and Miyamoto ***does not teach a thermoplastic resin fused*** to structures of sleeve or housing where hollow fibers are **potted** in the thermoplastic resin. Miyamoto ***only discloses thermoset epoxy resins*** which, unlike the thermoplastic materials of Applicants' claim 7, will not re-melt or otherwise regain the processability they had before being cured.

Miyamoto appears to disclose, see [0006], a hollow fiber membrane module comprising a plurality of hollow fiber membranes housed inside a case and having the open ends of the hollow fiber membranes "***fixed and sealed"*** to the end of the case using ***a casting resin,*** the hollow fiber membrane module characterized in that one or more grooves are formed continuously or intermittently at a predetermined depth in the surface of the inner wall at the end of the case, and in that the grooves are inclined relative to the center line of the case at an angle between 3° and 85°. Miyamoto also discloses, [0011], that the lower bundle end is **fixed and sealed** using a casting resin 4. The casting resin disclosed by Miyamoto is an **epoxy resin**, [0014], [0017], [0018]. **Epoxy resins are thermoset** resins and are not fused with the thermoplastic polypropylene hollow fibers or polycarbonate case of Miyamoto. In paragraph

[0002] of the translated Miyamoto document, Miyamoto describes previous modules in the art that were made using a "liquid thermosetting resin." There is no teaching or expectation of success from Miyamoto that a housing or sleeves with one or more structures interconnected by slots on an interior surface would withstand the Applicants' potting process and provide Applicants' exchanger with a unified terminal end block structure where the **thermoplastic resin is fused** to the housing and hollow conduits.

Eguchi teaches air release portions 5 for a **thermosetting** epoxy potting material 4 and case 2 (see Eguchi col. 6, lines 31-45 and also FIG. 1, FIG. 2, and FIG. 3). The hollow fiber type filter membranes 3 and the housing 4 ***cannot fuse*** with the thermosetting epoxy resin 4. It is **required** in Eguchi, col. 5, lines 23-28, that the air release portions 5 be formed such that the stop ring 1 is not entirely cut off. There is no suggestion that this structure (stop ring 1 and air release 5 portion that is not cut off) would be retained when a thermoplastic resin and thermoplastic housing **melt and are fused together in a terminal end block structure** as recited in Applicants' claim 7. Further, there is no teaching in Eguchi that the hollow fiber type filter membranes could be ***fused*** with thermoplastic resin and a thermoplastic housing without bubbles being trapped or the collapse of the fibers.

The combination of Miyamoto and Eguchi ***does not disclose fused structures*** or hollow conduits potted in a thermoplastic resin and only discloses thermosetting epoxy resins and not the thermoplastic resins of Applicants' claim 7. Accordingly, the combination of Miyamoto and Eguchi does not disclose one or more thermoplastic hollow conduits ***fused*** at a first end portion of the thermoplastic hollow conduits to a first thermoplastic resin and said first thermoplastic resin ***fused*** to one or more structures interconnected by slots on an interior surface of a first sleeve or to a first end of a thermoplastic housing in a unified terminal end block structure, said

thermoplastic hollow conduits ***potted in the thermoplastic*** resin. Applicants submit that claim 7 is patentable and respectfully request withdrawal of the Examiner's rejection.

The combination of Miyamoto and Eguchi does not discloses the exchange device of claim 7, and accordingly does not disclose the exchange device of claim 8 that further includes structures that are protrusions, grooves, or a combination of these. Applicants submit that claim 8 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 9, the combination of Miyamoto and Eguchi does not disclose the exchange device of claim 7, and accordingly does not disclose the exchange device of claim 9 where the structures are grooves in the surface of the housing or sleeves. Applicants submit that claim 9 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 10, Applicants were unable to find a disclosure in the combination of Miyamoto or Eguchi of a sintered thermoplastic coating on an interior surface of the sleeve or housing. Since Miyamoto and Eguchi do not disclose the exchange device of claim 7, the combination does not disclose the exchange device of claim 7 that further includes a sintered thermoplastic coating on an interior surface of the sleeves or housing and Applicants respectfully request that the Examiner's rejection of claim 10 be withdrawn.

Regarding claim 11, the combination of Miyamoto and Eguchi does not disclose the exchange device of claim 7, and accordingly they do not disclose the exchanger of claim 11 where the housing or sleeve includes fluid fittings. Applicants submit that claim 11 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 12, the combination of Miyamoto and Eguchi does not disclose the exchange device of claim 7 where the thermoplastic hollow conduits, thermoplastic resin, and thermoplastic housing are ***fused together*** in a unified terminal end block structure, the end

portion of the thermoplastic hollow conduits potted in the thermoplastic resin. Both Eguchi and Miyamoto disclose ***thermosetting resins which do not fuse*** with the housing or hollow fibers. Modifying the filter of Miyamoto with the teachings of Eguchi would not provide an exchange device of claim 12 where the thermoplastic hollow conduits are perfluorinated, the thermoplastic resin is perfluorinated, and the thermoplastic housing having two or more grooves interconnected by vent channels is perfluorinated and where these are ***fused together*** in a unified terminal end block structure such that the end portions of the perfluorinated thermoplastic hollow conduits are potted in the perfluorinated thermoplastic resin. Accordingly the combination of Miyamoto and Eguchi does not disclose Applicants' claim 12, and Applicants respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 13, the combination of Miyamoto and Eguchi does not disclose the exchanger of claim 7, and accordingly does not disclose the exchange apparatus of claim 13 where the thermoplastic hollow conduits are porous hollow fibers, skinned hollow fibers, thermoplastic conduits, co-extruded hollow conduits, or combinations of these. Applicants submit that claim 13 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 14, the combination of Miyamoto and Eguchi does not disclose the exchanger of claim 7, and accordingly does not disclose the exchange apparatus of claim 14 where ends of the thermoplastic hollow conduits are opened to fluid flow. Applicants submit that claim 14 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 21, the combination of Miyamoto and Eguchi does not disclose Applicants' exchange apparatus of claim 7 or the exchange apparatus of claim 16. Further, Applicants cannot find a reference in Miyamoto or Eguchi that discloses a method of flowing a

first fluid to be treated on a first side of one or more thermoplastic hollow conduits and flowing a second fluid on a second side of the thermoplastic hollow conduits in a exchange apparatus and transferring mass, energy, or a combination of these between the first fluid and the second fluids through a wall between a first side and a second side of the thermoplastic hollow conduits. Applicants found that Miyamoto appears to disclose in paragraph [0015] heat cycle testing where 80 °C water is first passed through the module followed by 15°C water that is passed through the module. However heat exchange between a *first fluid and a second fluid* ***through*** *a wall between a first side and a second side of the thermoplastic hollow conduits* as recited in Applicants' claim 21 is not taught by Miyamoto. **Eguchi** discloses a "cold water-hot water repeated dipping test" in col. 7, lines 45-53; Applicants cannot find reference to mass or heat exchange between two fluids through a wall of the thermoplastic hollow conduits in Eguchi. Applicants' disclosure, for example paragraphs [0046] and [0010], disclose transferring energy between the walls of the hollow conduits in the exchanger. Applicants' disclosure, paragraph [0069], discloses transferring mass (gas contacting) where a liquid flows on a first side of the membrane (first fluid) and a gas mixture (second fluid) flows on the second side of the membrane. Applicants cannot find a teaching of the method of claim 21 in the combination of Miyamoto and Eguchi and respectfully request that the Examiner's rejection of claim 21 be withdrawn.

Since the combination of Miyamoto and Eguchi does not disclose the method of claim 21, the combination of Miyamoto and Eguchi does not disclose the method of claim 22 where thermal energy is transferred between the first fluid and the second fluid, the combination does not disclose the method of claim 23 wherein the wall between the first side and the second side of the thermoplastic hollow conduits is non-porous, and the combination does not disclose the

method of claim 24 wherein the wall between the first side and second side of the thermoplastic hollow conduits is porous. Applicants submit that claims 22-24 are patentable and respectfully request that the Examiner's rejection be withdrawn.

Since the combination of Miyamoto and Eguchi does not disclose the exchange device of claims 7 or 16, the combination of Miyamoto and Eguchi does not disclose Applicants' apparatus of claim 25. Further, Applicants cannot find in either of the Miyamoto or Eguchi documents of record any disclosure of a fluid controller fluidly connected to a second fluid outlet of the exchange device in fluid communication with the second fluid inlet of the exchange device, where the fluid controller provides conditioned fluid to one or more substrates treated by the apparatus. Applicants submit that claim 25 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 26, Applicants cannot find in the combination of Miyamoto and Eguchi a disclosure of Applicants' apparatus of claim 25 that includes the exchange device of claim 7 or claim 16 and wherein the second fluid outlet that is in fluid communication with the second fluid inlet provides conditioned fluid to a tank containing one or more substrates. Miyamoto discloses heat cycle testing in paragraph [0015], Eugchi discloses a "cold water-hot water repeated dipping test" or an "autoclave repetition test" (col. 7, lines 45-53). Applicants submit that claim 26 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 27, Applicants cannot find in the combination of Miyamoto and Eguchi a disclosure of the apparatus of claim 25 that includes the exchange device of claim 7 or claim 16 and where the fluid controller is a pump, a dispense pump, or a liquid flow controller. There does not appear to be a disclosure in either of these documents of a pump or liquid flow controller that is fluidly connected to a second fluid outlet of an exchanger that provides

conditioned fluid to one or more substrates. Applicants submit that claim 27 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 28, Applicants cannot find in the combination of Miyamoto and Eguchi a disclosure of an apparatus of claim 25 that includes the exchange device of claims 7 or 16 and where the exchange fluid is a source of temperature controlled fluid. Applicants submit that claim 28 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 29, Applicants cannot find in the combination of Miyamoto and Eguchi a disclosure of an apparatus of claim 25 that includes the exchange device of claims 7 or 16 and where the substrate treated includes silicon. Applicants submit that claim 29 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Claims 30-34 were canceled from the Application without prejudice by the Applicants.

**Item 5.** Applicants respectfully traverse the Examiner's rejection of claims 15, 35, and 36 under 35 U.S.C. § 103(a) over Miyamoto (JP 05049875) in view of Eguchi (EP 0706818) and further in view of Cheng et al. (US 6,582,496), and Applicants request reconsideration and withdrawal of this rejection. The Examiner has asked the Applicants to show that claims 15, 35, and 36 are patentable in view of these documents.

Claims 35 and 36 were canceled by the Applicant without prejudice.

Regarding claim 15, Applicants cannot find a disclosure in Cheng, Miyamoto, or Eguchi of perfluorinated thermoplastic resin ***fused*** to perfluorinated thermoplastic hollow conduits and perfluorinated thermoplastic housing (or sleeves) where the housing(or sleeves) has one or more structures on an interior surface interconnected by slots. Applicants submit that claim 15 is patentable and respectfully request that the Examiner's rejection be withdrawn.

**Item 6.** Applicants respectfully traverse the Examiner's rejection of claims 16-20 under 35 U.S.C. § 103(a) over Cesaroni et al. (US 6,149,422) in view of Doh et al. (WO 03/029744) and request reconsideration and withdrawal of this rejection. The Examiner has asked the Applicants to show that claims 16-20 are patentable in view of Cesaroni et al. (US 6,149,422) and Doh et al. (WO 03/029744).

Applicants have clarified claim 16 to show that the exchange device includes one or more co-extruded thermoplastic hollow conduits, said co-extruded thermoplastic hollow conduits have an inner thermoplastic layer fused to an outer thermoplastic layer, **the outer thermoplastic layer of said co-extruded thermoplastic hollow conduits has a lower melting point temperature than the inner thermoplastic layer of said thermoplastic hollow conduits**. The end portions of the co-extruded thermoplastic hollow conduits are ***fused*** to the thermoplastic resin and are potted in the first and second thermoplastic resins. Cesaroni does not disclose Applicants' co-extruded hollow conduits where end portions are fused to the thermoplastic resin and potted therein.

Cesaroni (col. 4, lines 35-40) teaches that a heating block 3 is heated to a temperature sufficient to effect melting of the polymer used in the formation of tubes 9, **but does not** teach that the heating block is heated to a temperature sufficient to effect melting of channel block 8 for fusing channel block 8 with tubes 9. Cersaroni teaches away from fusing tubes 9 within channel block 8 because for example, Cesaroni, col. 4, lines 39-44 along with reference to FIG. 3 and FIG. 4:

> "Pins 5 are at a temperature of less than the melting point of the polymer of tubes 9 and preferably less than the softening point of such polymer, such that pins 5 will readily slide into and along tube 9".

Clearly the polymer of tubes 9 ***in*** the channel block 8 is not softened or fused to channel block 8 because the cooling pins are at a temperature less that the melting point of the polymer of the tubes, and accordingly the ***tubes 9 are not fused or potted*** with channel block 8.

Cesaroni discloses that the polymer from the tubes 9 is separate and **not fused** to channel block 8 since the polymer forms a layer ***on*** the surface 8 (Cesaroni, col. 4, lines 55-67, **emphasis added**):

> "Heating block 3 and article 8 are brought into close proximity. In doing so tube 9 contacts surface 4 of heating block 3 and the polymer thereof becomes molten. The molten polymer, 12, is forced to spread away from pin 5. As heating block 3 and article 8 come into close proximity, the molten polymer 12 forms a continuous **layer**, or substantially continuous layer, of polymer **on the surface of article 8**. Heating block 3 is then withdrawn from the position close to article 8 leaving article 8 with the layer of polymer, which quickly cools and solidifies."

According to Cesaroni, melting of tube 9 only occurs at the surface 4 of heater block 3 to form polymer melt 12 **on** channel block 8, while the cooling pin 5 keeps tube 9 in channel block 8 cool whereby it cannot melt with channel block 8.

Lastly, Cesaroni discloses (col. 4, lines 27-31 **emphasis added)**:

> "FIG. 5 shows channeled block 8 after separation from heating block 3. Channeled block 8 now has tube 9 located within channel 10 with **a layer 13 of polymer formed across surface 11** of channeled block 8. Tubes 9 have thus become bonded to channeled block 8. Layer 13 was formed on cooling of melt pool 12."

FIG. 5 of Cesaroni show a distinct layer of polymer 13 across surface 11 of channel block 8 but **does not teach** that the polymer 13 is fused to surface 11 of channel block 8. Accordingly there is no indication or teaching in Cesaroni of hollow conduits potted in thermoplastic resin where the hollow conduits are fused to the resin as shown in Applicants FIG. 3 and recited in Applicants' Claim 16.

Regarding co-extruded tubes, Cesaroni discloses, col. 2, lines 57-60,

> "In a still further embodiment, the tube is coated with an adhesive to promote adhesion to the polymer of the article and/or said tube is **a co-extruded tube** with the outer layer promoting bonding of said tube to the polymer of the article."

Cesaroni **does not disclose co-extruded thermoplastic hollow conduits *fused*** with a thermoplastic resin where the hollow conduits **are potted** in the resin. In Cesaroni, the molten polymer 12 forms a continuous **layer**, or substantially continuous layer, of polymer **on the surface of article 8**.

Lastly, there is no disclosure of any co-extruded hollow conduit composition in Cesaroni, (see col. 6, lines 1-67) where the outer thermoplastic layer of the hollow conduit has a lower melting point than the inner layer of the conduit as recited in Applicants' claim 16 and shown in Applicants' FIG. 3 and description, paragraphs [0044], and [0051]. Applicants submit that claim 16 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 17, the combination of Cesaroni and Doh does not disclose the exchange device of claim 16, and Applicants respectfully submit that the combination does not disclose the exchange device of claim 17 where ends of the co-extruded thermoplastic hollow conduits of the terminal end block structure are opened to fluid flow. Applicants submit that claim 17 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 18, the combination of Cesaroni and Doh does not disclose the exchange device of claim 16, and Applicants respectfully submit that the combination does not disclose the exchange device of claim 18 where the housing or sleeve includes fluid fittings. Applicants submit that claim 18 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 20, Applicants cannot find in the combination of Ceseroni and Doh a disclosure of perfluorinated co-extruded hollow conduits fused to and potted in a perfluorinated thermoplastic resin where the hollow conduits have an inner perfluorinated thermoplastic layer and an outer perfluorinated thermoplastic layer and where the outer perfluorinated thermoplastic layer has a lower melting point temperature than the inner perfluorinated thermoplastic layer. Applicants submit that claim 20 is patentable and respectfully request that the Examiner's rejection be withdrawn.

Regarding claim 19, Applicants **cannot find in the combination of Ceseroni and Doh a disclosure of co-extruded hollow conduits** or the use co-extruded thermoplastic hollow conduits with an outer layer and an inner layer; Doh discloses hollow thermoplastic hollow tubes ***impregnated*** with thermally conductive powders or fibers (pg. 11, line 6). Cesaroni discloses, col. 2, lines 57-60, "a coextruded tube with the outer layer promoting bonding of said tube to the polymer of said article." However there is no teaching or suggestion in Cesaroni related to co-extruded thermoplastic hollow conduits with thermally conductive material in the outer layer that are fused to a thermoplastic resin. Applicants submit that claim 19 is patentable and respectfully request that the Examiner's rejection be withdrawn.

In view of the remarks presented above, it is respectfully submitted that all of the pending claims are in condition for final allowance and notice to such effect is respectfully requested. Although Applicant believes no fees are due, the Commissioner is hereby authorized to charge deposit account No. **501-908** for any fees that may be due in connection with this response. Should the Examiner have any questions regarding these remarks, the Examiner is invited to initiate a telephone conference with the undersigned.

Respectfully Submitted,

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